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SEASON 1953-54

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NYASALAND

COTTON EXPERIMENT STATION, CHITALA
PROGRESS REPORT FOR THE SEASON 1953-54

BY

H. C. DUCKER.

Mr. R. Smith proceeded on long leave in September 1953, prior to transfer to Ilonga, Tanganyika Territory. Mr. R. Soar left on long leave in April and returned in September, 1954.

District	*Elevation feet a.s.l.*	*Type of crop*	*Sown*	*Harvested*	*Legal close seasons*
Southern and Central Provinces	Approx. 200-2,500	Summer	Dec.-Jan.	June-July	Aug.-Nov.
Northern Province	1,600	Winter	May-June	Nov.-Dec.	Jan.-Apr.

Introductory Note.

Nyasaland experienced a shortfall in rain for the second year in succession, and the water supply situation in some areas is critical at the time of writing this report (October 1954). Fortunately the Experiment Station is served by two deep bore-holes, the supply from which seems unfailing. The Lower River cotton areas were the worst affected by drought conditions, though where distribution was good the crop did not suffer unduly. The Central Areas were more fortunate, particularly in their planting rains, which were early and sufficient for good germination. Rainfall in inches at the Cotton Experiment Station for the season 1953-54 was as follows:—

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.
—	1·76	8·71	8·23	6·16	1·10	0·15	—	—	—	—	0·80

The total for the growing season, of 26·11″, was about 8″ below the 20-year average, but good sowing rains at the end of November and in early December made the season very different from that of 1952-53. The fall of 0·8″ in September is exceptional; only three times previously has rain been recorded at Chitala during this month, and it is of interest to note that each time a good cotton year has followed.

Good yields were obtained with maize, fair yields with sorghum, and very good yields with groundnuts, but cotton again suffered severely from bollworm damage. Even so, with the better start to the season, yields were double those of 1952-53 at this Station, and some quite large returns were recorded in Dowa district, which produced 571 tons of seed cotton with a mean yield of 338 lb. of seed cotton per acre, compared with 347 tons at 248 lb. per acre last year. The CL20 multiplication areas at the Nyasaland Farming Corporation Balaka farms did well, averaging 613 lb. seed cotton per acre over 220 acres. But owing to the drought conditions a crop of about 10,000 bales lint is all that can be expected from the country as a whole.

The Egyptian cotton trial, repeated at Karonga, gave rather better returns than in 1952-53, but it has been decided that Egyptian types in their present guise cannot compete in yield with Uplands. Results were as under: —

TABLE 1.

KARONGA VARIETY TRIAL.

YIELDS IN LB. SEED COTTON PER ACRE.

Variety		*Type*
BAR 4/16	556	Egyptian
BLR 14/25	789	,,
X1730A	659	,,
Domains Sakel	780	,,
XL 1	583	,,
SUS 16/1 (Wilds)	923	Upland
BP52 (Namulonge)	1259	,,
CLB Karonga	1300	,, (Local control)
S.E.	44	

A further trial, planted in May, 1954, is of Upland types only, using Sudan and E. African long staple material with CLB Karonga and CL20 as controls. It is reported to be doing well, but yield figures will not be available till January 1955.

MECHANISATION.

Further experiments with the tractor disc-ridger have given good results, and a set-up suggested by Mr. A. L. Stephens of Namulonge bids fair to solve our problem of how to obtain even and regularly spaced rows. This set-up enables the tractor to construct two full ridges and two half ridges at one time.

A new type of disc cultivator will shortly be under trial, which it is hoped may improve land preparation and economise ploughing. The importance of the 'human factor' in efficient power cultivation can hardly be over-stressed.

Cotton.

Varietal trials comparing local and leading East African varieties were discontinued and replaced with trials between locally bred strains now in bulk. These were combined with further tests of 'Perenox' bactericide and repeated at the Tuchila Station in the S.E. section of the Central Areas and at three sites in the Lower River. Results were as follows:—

Table 2.

Variety Trial Results.
Yields in lb. seed cotton per acre.

Variety.	*Chitala*	*Tuchila*	*Kakoma*	*Ngabu*	*Makanga*	*Means.*
			Plain ginned seed.			
CLB	519	1084	674	862	913	810
CLB Filter	475	912	692	896	775	750
CL20	601	1100	636	1002	785	825
CL20 Filter	624	1146	632	952	734	818
			Seed dusted with Perenox.			
CLB	503	1117	691	801	897	802
CLB Filter	519	1135	669	985	863	834
CL20	632	1299	747	1002	804	897
CL20 Filter	596	1207	749	885	795	846
S.E.	13	36	29	31	31	

The high yields obtained at Tuchila are noteworthy and compare well with those of 1952-53. CL20 has again done well, especially when its seed was dusted with Perenox before sowing, while CLB is obviously still a valuable stock. The two 'filter' bulks, which were mechanical mixtures of the leading sub-strains of each local stock, did not surpass their parents.

The Perenox effects are dealt with more fully under 'Bacterial Blight' below, but it may be mentioned in passing that CL20 appears to be more susceptible to the disease than its parent CLB.

During the past three years, a falling-off in ginning outturn of cotton grown in the Lower River has been observed. This drop was first noticed in 1951, when early uprooting to control red bollworm was first enforced, and has continued in varying degree under the new régime. All varieties so far tested are affected, and there is evidence of seasonal fluctuations. The matter came to a head in 1954 when commercial saw ginnings of CLB had averaged only 28·13% G.O.T. up to 31st July.

Replicated roller ginnings were made from samples of the seed cotton from the variety trials listed in Table 2 above, and the following results were obtained:

TABLE 3.
SEED COTTON CHARACTERS—VARIETY TRIALS.

Variety.	*Chitala*	*Tuchila*	*Kakoma*	*Ngabu*	*Makanga*
			G.O.T. %		
CLB	32·7	32·0	28·6	29·4	32·0
CLB Filter	33·7	32·2	29·4	30·0	33·1
CL20	32·8	31·5	29·3	30·2	32·0
CL20 Filter	32·9	32·2	29·1	29·8	33·0
Means	33·0	31·9	29·1	29·8	32·5
			Wt. 100 Seeds, Grams.		
CLB	8·9	9·8	9·7	9·3	8·1
CLB Filter	8·7	9·7	9·7	9·3	8·0
CL20	9·5	10·4	9·7	9·4	8·2
CL20 Filter	9·6	10·4	9·9	9·7	7·9
Means	9·2	10·1	9·7	9·4	8·0
			Lint Indices, Grams.		
CLB	4·3	4·6	3·9	3·8	3·7
CLB Filter	4·4	4·7	4·1	4·0	4·0
CL20	4·6	4·8	4·1	4·1	3·8
CL20 Filter	4·7	4·9	4·1	4·1	3·9
Means	4·5	4·7	4·1	4·0	3·8

Low seed weights at Makanga made the ginning outturn at that place an exception to the general rule in the Lower River.

A large number of samples were drawn from the commercial CLB crop of both the Central Areas and the Lower River. Their seed cotton characters were measured and the same roller gin was used as for the variety trials. Mean results were as follows:—

TABLE 4.
SEED COTTON CHARACTERS—COMMERCIAL CROP.

	G.O.T. %	*Wt. 100 Seeds, Grs.*	*Lint Index, Grs.*
Central Areas	31·8	8·7	4·1
Lower River	28·7	9·0	3·6

It would appear that the new régime in the Lower River has resulted in slightly increased seed weights and considerably lessened lint indices, giving rise to a lowered G.O.T.

Examination of past records shows that there has been little or no genetic change in CLB over the past sixteen years, but that the new régime has resulted in a marked improvement in spinning quality. Maturity values have been well maintained and the conclusion therefore is that lint of increased fineness and strength is being produced. This is borne out by comparisons between fourteen strains of CL20 grown both at Chitala and at Makanga in 1952-53 and examined by the B.C.I.R.A., Shirley Institute. Their means for lint values are as follows:—

TABLE 5.

LINT CHARACTERS.

CL20 Variety	*G.O.T. %*	*Mean fibre wt.*	*Standard fibre wt.*	*At 40's Count×strength product*	*Yarn appearance*
Chitala	32·9(117)	158(113)	182(114)	2174	3·6
Makanga	28·0(100)	139(100)	159(100)	2492	3·7

The ratios given in brackets are with Makanga = 100. It will be seen that much of the G.O.T. difference can be accounted for by the fibre weight difference; slightly increased seed weight at Makanga would complete the picture, but unfortunately there are no records of seed weights for the 1952-53 material.

Ginning outturn is an important commercial consideration, and a solution is being sought to the Lower River shortfall. Possibilities lie in reselection under Lower River conditions from existing stocks, and the use of high ginning Albar 51 derivatives, among other measures. Suitable trials and arrangements are being planned for 1954-55, to be operated at Makanga and Ngabu.

BACTERIAL BLIGHT.

In addition to the experiments listed in Table 2, a trial to compare directly the effects of 'Perenox' and 'Perecot', using undressed seed as a control, was laid down at the Cotton Experiment Station, Chitala. It was realised when these experiments were planned that orthodox trials had been invalidated elsewhere by secondary infections among the growing crop, but it was believed from past observations that under Nyasaland conditions some useful results might be obtained, since the boll phase of bacterial blight is relatively uncommon, in most years and on most sites. Counts of infection were made on a total plant basis with the following results: —

TABLE 6.

SEED TREATMENT TRIAL.

Variety CL20	*Angular leaf spot phase. Counts at 4th true leaf. % Infected.*	*Blackarm phase at first flower. % Infected.*	*Yield lb. seed cotton per acre.*
Bulk control			
Untreated seed	26·6	10·6	376
Perenox dusted	7·8	4·6	384
Perecot dusted	4·9	2·5	382
S.E.	1·15	0·50	Not. Sig.

The treatment was 1 lb. Perenox (or Perecot) per 150 lb. ginned fully fuzzed seed, applied as a dry dust three weeks before planting. Similar observations were made on the cotton variety cum Perenox dusting trial (see Table 2) with results as summarised in Table 7.

TABLE 7.

VARIETY AND SEED TREATMENT TRIAL.

Variety.	*Angular leaf spot phase. Counts at 4th true leaf. % Infected.*	*Blackarm phase at first flower. % Infected.*	*Yield lb. seed cotton per acre.*
Untreated			
CLB	23·6	7·0	519
CLB Filter	22·6	10·2	475
CL20	30·5	7·1	601
CL20 Filter	30·4	8·3	624
Seed dusted with Perenox			
CLB	16·3	6·1	503
CLB Filter	13·8	6·1	519
CL20	20·0	5·1	632
CL20 Filter	19·4	8·3	596
S.E.	2·50	0·50	13

The treatment was exactly similar to that used for the previous trial (Table 6), and the CL20 seed stock was also identical.

One major difference between the two experiments was that the Perenox-Perecot trial was planted on land which had been resting under bush fallow for five years. The variety cum Perenox trial on the other hand was on land which had carried cotton two years previously. The heavier incidence of bacterial blight in the latter on CL20 may be due to field infection.

The above figures of yield are from Table 2, in which further comparisons may be made. The extra susceptibility of CL20 to the disease compared with its parent CLB has already been noted. The full analysis is not given in the tables, but at Chitala seed dressing was not significant in its effect on yields, while at Tuchila both dressing effect and interaction between seed dressing and variety were significant. For the Lower River experiments, results at Kakoma were the same as those of Tuchila for CL20 but not for CLB. At Ngabu, which had a very dry year, seed dressing had no significant effect on yield and at Makanga the result was the same.

Seed disinfection by a bactericide is obviously beneficial in Nyasaland under certain circumstances, and it seems to have its major effect on yield by rendering the young plants more healthy. The most noticeable reduction by it was in the angular leaf spot and vein lesion counts on such young plants. The blackarm phase was much less common though significant differences were still observable in the trials. The boll phase was distinctly uncommon and could not be recorded satisfactorily from the trials.

To obtain some idea of the incidence of this last phase, random samplings were made in suitable bulk fields at the beginning of harvest, the entire crop being stripped from 50 holes in each case. Results are shown in Table 8.

TABLE 8.

AT HARVEST. % ANALYSIS OF TOTAL CROP FROM PLANTS OF 50 HOLES.

	Bollworm damaged	*Stainer damaged*	*Bacterial blight damaged*	*Sound bolls undamaged*
Chitala	50·6	10·9	2·1	36·4
Tuchila	21·2	40·9	7·4	30·5
Kakoma	40·2	42·9	5·0	11·9
Ngabu	25·3	17·1	2·2	55·4
Makanga	37·9	46·5	2·8	12·8

The position therefore where bacterial blight is concerned in Nyasaland was that this past year the angular leaf spot and allied phases were frequent, the blackarm phase less so, and the boll phase relatively uncommon. There seems to be an indication that the health of young plants is important in determining final seed cotton yields, and for this reason seed treatment is to be recommended. Other years with heavier rainfall may result in greater infection and more emphasis on the later stages of the disease. Seed treatment may be looked upon as an insurance while susceptible or partly susceptible varieties are being cultivated, and the introduction of truly resistant varieties may obviate the need for its use. Albar 51 stocks grown in observation plots at Chitala have shown considerable promise, and there is some good material in the Albar 49 crosses, though some heavy roguing of jassid susceptible plants has been necessary. It is proposed to put a number of these stocks into variety trials at Chitala, Makanga and Ngabu.

INSECT PESTS.

Red bollworm, *Diparopsis castanea* Hmps., was again the dominant pest at Chitala, but Tuchila escaped with a relatively light infestation. Quite large populations were observed at Lower River stations in early May, where egg counts made by the Government Entomologist showed that the main carry-over flight began emerging in late March. It is obvious that there is still plenty of bollworm about, and a very slight slackening in the precautions now taken in the Lower River might have serious after-effects. There must be no relaxation of the early-planting early-uprooting régime, and it is to be hoped that the pest will not adapt itself to present circumstances.

The Lower River is now making a crop before the bollworm attains large numbers, but at Chitala and elsewhere in the Central Areas the position remains serious. Here, in spite of 31st July uprooting the carry-over from one season to the next remains large, and what is worse, the main moth emergence takes place in January and early February, about two months earlier than is the case in the Lower River. Some more positive means of control is required.

Stainers are at present of more importance than bollworm in parts of the Lower River. It was difficult to find a really sound boll at Makanga in May and as seen above, the seed cotton suffered in quality and quantity. Ngabu and other areas to the west of the Shire River were less affected, but some late cotton at Kakoma was rather badly damaged. The discrepancy in the G.O.T. figures for Makanga is largely due to stainer damage.

Husbandry and Rotation Crops.

The necessity for earliness with raingrown cotton has been stressed on many occasions. A series of experiments, comparing four dates of sowing and two levels of weeding in a split-plot layout, gave the following results:—

Table 9.

Sowing and Weeding Trial, 1953-4.

Clean weeded throughout	*Yields in lb. seed cotton per acre.* *Chitala*	*Tuchila*	*Ngabu*	*Makanga*	*Means*
Sown 21 Nov.*	244	1239	732	1005	805
,, 7 Dec.	194	1017	638	976	706
,, 21 Dec.	157	609	618	704	519
,, 6 Jan.	34	—	—	89	61
Weeding delayed ten days, thereafter clean weeding.					
Sown 21 Nov.*	204	919	708	974	701
,, 7 Dec.	189	523	524	816	514
,, 21 Dec.	91	410	506	550	389
,, 6 Jan.	19	—	—	82	50
S.E. Sowings	9·3	45·7	51·3	58·6	
S.E. Weedings	9·6	41·6	47·2	45·2	

*The first sowing at Chitala was on 30th November.

These results are strikingly clear and it is noticeable that even so small a delay as ten days in weeding had a markedly significant effect. There was no significant interaction between sowing date and weeding delay.

Manurial trials, to test further the effect of sulphate of ammonia, were carried out with cotton at Chitala and Makanga.

Three rates of nitrogen at three timings were used but there were no significant differences between the final yields at either station. Nitrogen was evidently sufficient from natural sources in so dry a season.

As in previous years, experiments with rotation crops were linked with general trials conducted by the Department of Agriculture. They were confined this year to a maize manuring trial with nitrogen at various levels and at differing timings, and to a groundnut variety trial, using the best twenty-five varieties from last year. Results were good, especially with groundnuts, which produced well over one ton of nuts in shell per acre. The full figures will be published elsewhere with those of the Departmental trials.

Sorghum is a successful crop at Chitala and a Sudan variety, called Karinaka, was sown in large bulk on land due for rest. The crop was left unweeded and untouched till harvest. Seed stocks of this variety, which has a bold white grain and is attractive to the African, have been supplied to the Department of Agriculture for issue in the Chikwawa district. Well-treated Karinaka yields nearly 2,000 lb. grain per acre, but harshly served as it was at Chitala this year the crop averaged only 600 lb. per acre.

All land not in use as arable is now under bush fallow and is being grazed by the cattle herd. Some thirty acres were mown to help to provide dry season feed. Tree growth is a nuisance but not too expensive to deal with by hand if not allowed to become too large. The same applies to termitaria, which spring up at a great rate. No serious attempt has yet been made at artificial establishment of grasses other than elephant grass, but observation strips were broadcast with Rhodes grass, *Chloris gayana,* this past season. For the most part the cattle seem well satisfied with a local grass, *Urochloa mossambicensis,* which self-seeds generously, is perennial but easily ploughed out, and is of high food value.

The herd has more than doubled in numbers since it arrived in May last year. Ten calves were produced by nine cows as a first crop, and five have so far been born in the second crop of calves now arriving. One unfortunately had a deformed foot and had to be killed. Tsetse fly continues to remain absent, and there are very few ticks.

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